



The **American Fertilizer**

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No. 4 and 5



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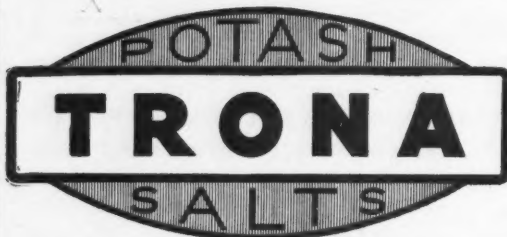
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...THE...

AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 100

FEBRUARY 12 and 26, 1944

No. 4

Where Do We Stand With Fertilizers?*

By FORD S. PRINCE

University of New Hampshire, Durham, New Hampshire

IN TIMES like these, when almost anything can happen, it is well to pause oftentimes to see where we stand. Take this matter of fertilizers. We have already experienced a period of nitrogen shortage. We assume what with new synthetic plants in operation, that this won't happen again. This year we are faced with a tight potash situation due to the greatly expanded demands being put upon our domestic supplies. These supplies are far from consuming centers. A transportation breakdown, a protracted strike, or a well-directed enemy bombing attack, any one of these things could create a very serious situation with potash. There are a great many things, no doubt, that could happen to our superphosphate supply.

Let us suppose then, for purposes of illustration, that one of these critical fertilizer ingredients will be so short that it can be obtained only in limited quantities or not at all. Where would the dairyman stand? Or the potato grower? In other words what is the effect of each one of these elements upon crop production?

Last spring when nitrogen was reduced 20 per cent in all fertilizer grades and even more in the Victory Garden Special, there was considerable talk about the "poor" fertilizer that had to be used. Yet no victory garden failures have come to our attention. At harvest time, many potato growers in New Hampshire tried to place the blame for poor yields on the lack of nitrogen in the fertilizer. But as Maine growers produced bumper acre yields, we must conclude that low yields in New Hampshire should be blamed largely upon the weather

and not upon fertilizer quality, since Maine growers used the same quality of fertilizers as did our farmers.

We have made an attempt in New Hampshire when publishing results of research to evaluate separately the effects of the three fertilizer nutrients. In each case these results have applied to specific crops or to pastures. In this article we will make an attempt to summarize these values so far as possible for the entire range of field crops in which we are interested at the moment.

Take the potato crop which was under study in New Hampshire for 12 years in one location and 6 years in another, with fertilizer tests similar in both cases (1).† Potatoes were grown without nitrogen or phosphoric acid or potash, then each element was doubled and all six treatments were compared with a standard check which happened to be a 4-8-7 grade, one ton per acre.

The average yield of these two tests, one of which was conducted in northern, the other in southern New Hampshire, was 312 bushels of potatoes per acre. Variations from this check plot yield where the two sets of figures are combined were as follows:

TABLE I

Grade of Fertilizer	Variation from Check, Bu. per A.
0-8-7	-17
8-8-7	+12.5
4-0-7	-68.5
4-16-7	+32.5
4-8-0	-102
4-8-14	+26

Leaving out an element always depressed the yield as might be supposed. Conversely,

*Reprinted from "Better Crops With Plant Food," January, 1944.

†Numbers in parentheses refer to literature cited at the end of the article.

doubling an element always increased the yield. Omitting an element caused a greater depression in yield per unit of fertilizer than a similar amount of fertilizer increased the yield.

Turning these figures around, we may say that the first four units of nitrogen returned 17 bushels while the second four boosted the yield only 12.5 bushels. Similar results for phosphoric acid, for the first eight units were 68.5 bushels and for the second eight 32.5 bushels, while for potash the results were 102 and 26 bushels respectively.

In Table II we have presented the average response of these fertilizer ingredients when used in amounts below or above the check plot application. The response per unit has been calculated directly; potatoes have been figured at \$2.25 per hundredweight; and fertilizer costs at \$40 per ton for sulphate of ammonia, \$25 per ton for 20 per cent superphosphate, and \$48 per ton for muriate of potash, 60 per cent grade. The potato price used presum-

The yield variations are somewhat wider than those of New Hampshire where elements are omitted. This is to be expected since total yields are higher, and under conditions that produce high yields, variations will always be wider. Differing from New Hampshire, however, are the responses for increasing the nitrogen and phosphoric acid. In these Maine data very little increase in potato yield was noted when nitrogen was increased to over two per cent, and there was no increase for amounts of more than four per cent of phosphoric acid in the fertilizer.

With potash, however, increases were secured when as much as 14 per cent of this element was included in the fertilizer. In this respect the data are much like those of New Hampshire. The fundamental difference then is the lack of response to phosphorus in the Maine potato-growing systems.

Connecticut (3) results show a decrease of 78 bushels for omitting nitrogen and no increase for amounts over 100 pounds of elemental nitrogen per acre. They also indicate

TABLE II
UNIT VALUE OF FERTILIZER NUTRIENTS ON POTATOES

	Gain for First Increment per unit, bushels		Cost of Fertilizer	Net Gain
	Value			
N.....	4.25	5.74	2.00	3.74
P ₂ O ₅	8.56	11.56	1.25	10.31
K ₂ O.....	14.57	19.67	.80	18.87

	Gain for Second Increment per unit, bushels		Cost of Fertilizer	Net Gain
	Value			
N.....	3.12	4.21	2.00	2.21
P ₂ O ₅	4.06	5.48	1.25	4.23
K ₂ O.....	3.71	5.01	.80	4.21

ably represents the floor price for the current season. These figures all vary somewhat from actual values but are close enough to actuality for purposes of comparison.

Results reported by Chukka, Hawkins, and Brown (2) from the Maine Station place less emphasis upon phosphoric acid and even more upon potash than those discussed in detail from New Hampshire. This difference in phosphorus response is no doubt due to the more intensive system followed in growing potatoes in Maine and to an accumulation of phosphoric acid in the soil from repeated applications of fertilizer.

In the reference cited, (table 9, p. 132), data covering 12 years of work are available.

In Table III the variations in yield from the check plot are presented. One ton of fertilizer was applied in each case, the check plot receiving one ton of a 4-8-7 grade.

TABLE III

Treatment	Bushels per Acre
0-8-7	-84
2-8-7	-9
6-8-7	3
4-0-7	-103
4-4-7	1
4-8-0	-248
4-8-4	-26
4-8-10	19

a decrease of 103 bushels for leaving phosphoric acid out of the formula, with no gain for increasing this element to more than 160 pounds per acre. Omitting potash caused a decrease of 121 bushels, with no yields higher than those produced with 120 pounds of this element in a balanced fertilizer.

If we look at the research data from all three States as a unit we find that omitting nitrogen, phosphoric acid, or potash caused decreases on the average of about 20, 30, and 50 per cent, respectively, when fertilized normally otherwise and compared with check plot yields. These percentages give some idea of the importance of the three elements and their influence on potato production.

It would be very gratifying in presenting data of this sort if we could predict accurately what each added increment of plant food would return in crop yields. There are some reasons why this cannot be done. In the first place, we haven't all the data; and in the second, the old law of diminishing returns steps in to give the first increment greater influence than the second and so on.

The data from Maine, however, are fairly complete on this point, the nitrogen having been increased two units, while phosphoric acid was stepped up four units and potash from zero to four to seven, then to 10 and 14.

The first two units of nitrogen in these Maine tests gave 80 per cent of the increase recorded for nitrogen, up to a total of six units. The second two units gave nine per cent of the increase, while the third two units gave 11 per cent, the total increase being 105 bushels for nitrogen.

The first four per cent of phosphoric acid gave all of the increase in the Maine results.

With potash, 81 per cent of the increase came from applying the first four units, nine per cent from the next three, six per cent from the next three, and four per cent for boosting the amount from 10 to 14 units.

The results for nitrogen in the three references cited are fairly consistent, and it seems fairly accurate to say that good crops of potatoes can be produced with 80 pounds of nitrogen, the maximum being reached with around 100 pounds of nitrogen per acre.

In New Hampshire, good crops of potatoes can be predicted where 160 pounds of phosphoric acid are used, but maximum crops need a slightly higher phosphorus level, probably 240 pounds per acre. In Connecticut, maximum yields can be obtained by using 160 pounds and in Maine by using 80 pounds, although 120 are recommended for safety.

One hundred and twenty pounds of potash appear to produce maximum crops of potatoes in Connecticut, but in New Hampshire and Maine maximum crops need at least 240 pounds, although good crops are produced at a somewhat lower level.

Fertilizers for Forage Crops

I have summarized data for the potato crop first in this article because almost 50 per cent of the mixed fertilizer used in New England goes to potatoes. Of even more importance to more people in New England is the fertilizer used on forage crops. Of the total fertilizer used almost 18 per cent is applied to hay crops and 13 per cent to pastures, making the impressive total of nearly one-third of all fertilizer consumed going to this crop group.

Much research work has been done to indicate what response is likely to be secured from using fertilizer nutrients singly or combined on hay and pasture plants. The crops naturally divide themselves into grasses and legumes in any fertilizer discussion since grasses are more responsive to nitrogen and the legumes to potash and phosphoric acid.

Take grass hay, as an example. We have found in New Hampshire (4) that nitrogen is the biggest limiting factor to high yields, but that the response from nitrogen will be reduced when there is a deficiency of phosphoric acid and potash in the soil. Where this is the case the response from phosphoric acid and for potash will be increasingly greater. In other words, grass hay fields amply supplied with these two elements will continue, for a year or two at least, to yield well with nitrogen alone, but without available supplies of phosphoric acid and potash in the soil a complete fertilizer must be applied. This forms the basis for the 1-1-1 fertilizer ratio which is almost universally accepted as the correct one for top-dressing grass hay lands.

In our work in New Hampshire, in which hay lands have been top-dressed with nitrogen alone and with a fertilizer approximating a 1-1-1 ratio, the results have been somewhat varied, and colored by past soil treatment. In one test on a soil in which neither phosphoric acid nor potash were limiting factors, an application of 32 pounds of nitrogen in nitrate of soda brought a response of 1,462 pounds of cured hay per acre, while the same number of pounds each of phosphoric acid and potash caused an increase of 728 pounds. When a complete fertilizer equal to the two separate treatments was applied, the increase was 2,159 pounds. The treatments were all applied at a gain of more than double the fertilizer costs.

In a similar test on a very heavy soil which was seriously deficient in both phosphoric acid and potash, 32 pounds of nitrogen gave an increase of about 600 pounds of hay while a complete fertilizer with 32 pounds of each of the elements gave an increase of 1,600 pounds.

A search of the literature reveals many interesting trials where fertilizers or manure and superphosphate have been used. The results all vary in extent but differ little in trend. They all point to one significant fact, that there is nothing more certain than that nitrogen applied to a straight grass crop will stimulate growth. The extent of the increase, or, stated in another way, the utilization of this nitrogen, will be governed by the amount of available phosphoric acid and potash in the soil. Unless it is known that these elements are present in the soil in amounts so as not to become limiting factors, a complete fertilizer should always be used.

With alfalfa and the clovers the story is entirely different. In fact potash stands in the same place with legumes as nitrogen does with the grasses. The extent then that potash

fertilizers are required to produce maximum crops is governed by the amount of available potash in the soil or that which can be made readily available during the growing season.

It is a well-known fact that although the supply of total potash in mineral soils is very large, there is only a small percentage of it available at any one time. Also, that potash in certain minerals is much more usable than it is in others. If soils have been formed from those minerals which yield up their potash readily to plants, the need for potassium fertilizers is much less than where these minerals are slowly soluble. This fact no doubt explains the differences noted in potash response when studying results from widely separated experiments over the United States.

It would appear that native New England minerals yield up their potash slowly in plant growth. Further the reversion of applied potash to native mineral forms is probably higher here than it is in many other places, thus establishing a fairly strong need for potassium in the fertilizer for the groups of crops under discussion. The greater the feeding power (or the larger the crops which are produced), the greater is that need. Nor do we mean to minimize the need for phosphoric acid, and likewise, we must assume that the lime requirement must be met for the crop to be grown. This latter fact, however, only emphasizes the need for potassium in the fertilizer.

Financial Returns from Potash

To be more specific, alfalfa and ladino clover, both rapid growing and highly productive crops, have a high potash requirement. The comparative need in relation to yield is doubtless just as great for the other clovers.

This is well illustrated by the results of research work in our own as well as some of the other New England States. In one report dealing with alfalfa (5) one dollar invested in potash gave a return of four dollars in hay, and compared with \$3.50 per ton returns for manure applied at a 20-ton rate. Superphosphate applied at the rate of 500 pounds of 16 per cent superphosphate barely managed to pay its cost and then only with heavy manure applications. Nitrate of soda did pay its way applied at the light rate of 100 pounds per acre.

In another test on the same field (6) in which the alfalfa seeding was further from a manure application, the returns per dollar invested were \$2.29 for nitrogen, \$1.39 for phosphoric acid, and \$3.72 for potash. These results all refer to cases in which the elements

were top-dressed annually, but used singly.

Soils of the Connecticut Valley have given good response to fertilizers containing potash in growing legumes. Our preliminary work in this area was with a mixed stand of alfalfa and timothy (7). With hay and fertilizers calculated at normal values, one dollar invested in nitrogen, used with phosphoric acid and potash, returned \$3.89 in hay. One dollar invested in phosphorus returned \$0.97 when used alone, \$1.63 used with potash, and \$1.79 used with lime and potash. One dollar invested in potash returned \$3.07 used alone, \$4.78 used with lime, \$3.76 used with phosphorus, and \$5.93 used with both lime and phosphorus. All of this work pointed to a need for fertilizer balance as can readily be seen.

In other work on this field (7) (8) red and alsike clover were grown either alone or in mixtures. An average of eight crops ascribes a gain in hay values of \$1.74 for the use of 100 pounds of nitrate of soda, only \$0.41 for 400 pounds of 20 per cent superphosphate, but \$9.53 for the use of 125 pounds of 60 per cent muriate of potash. When the superphosphate and potash treatments were combined, the gain was \$27.00, again indicating the need for balance so far as phosphoric acid and potash are concerned.

One of the significant phases of this work in the Connecticut Valley has been the persistence of red clover over a period of years in all plots treated with potash, no matter what other treatment was employed. In a seeding made in 1938, this species still exists in the stand and good yields of hay are still being cut. Work is now under way to determine how much potash must be used to secure this effect, also how long the red clover will continue to occupy a fair percentage of the hay stand with the requisite fertilization.

Fink, working in Maine, reports green weight yield of a ladino-timothy mixture as follows:

TABLE IV

Treatment	3-yr. Average
1. 10 T.M. + Super, 60 lbs. P_2O_5	5.2 Tons
2. 80 lbs. P_2O_5 + 80 lbs. K_2O	4.67 Tons
3. No treatment.....	3.53 Tons
4. 40 lbs. N + P & K as in 2.....	6.60 Tons

These yields are for the first cutting, or hay crop, and do not include the yields later in the three seasons when the land was pastured.

The author points out that while nitrogen is not needed to maintain a ladino-timothy stand, it does markedly increase the yield of the first cutting. As a matter of fact, satis-

(Continued on page 24)

FREE ENTERPRISE*

By HENRY M. WRISTON

President of Brown University

FREE enterprise is a subject upon which, when definitions are avoided, nearly everyone can agree. Few will talk against it, but many give it public support on the basis of unspoken definitions which leave little substance to the idea.

If this discussion is to be useful, it must be clear, though not entirely palatable. The lessons of experience must be learned, even when they are hard. I propose to analyze the phrase, discuss its real meaning, and suggest ways in which business men can serve free enterprise.

Enterprise Without Freedom

We should begin by admitting that there is no necessary connection between freedom and enterprise. From one point of view that is self-evident; the very use of the word "free" to qualify the word "enterprise" implies that there are instances of enterprise without freedom. If freedom had a monopoly upon industry and resourcefulness, courage and faith, we should not be at war; or if war started through some political folly, the totalitarians could never gain an initial advantage; nor should we welcome a communist state as an ally.

What logic suggests, experience confirms. Impressive manifestations of energy, imagination, skill, and daring in invention, development, and production have occurred under tyranny. The oil industry, chemicals, pharmaceuticals, biologicals, yarns, fabrics, and many others have had to compete with *I. G. Farbenindustrie*. They have good reason to know that between the two wars German business was enterprising.

The Soviets have astounded friend and foe alike. They have led the world in the application of higher mathematics to engineering problems, substituting exact calculations for wasteful empiricism. In medicine, and more particularly in surgery, they have shown vigor in conception and resourcefulness in technique which have produced modern miracles of healing. The construction and operation of

Magnetogorsk and the other cities beyond the Urals are impressive illustrations of enterprise.

Even the Japanese, that faceless and selfless, but fearless and energetic people, have shown enterprise. Without natural resources, without an industrial tradition, without widely diffused wealth, they boldly proclaimed an enterprising program. They snatched markets from beneath our noses, and territories from beneath our feet. We are hard put to win them back.

While we were hearing about our mature economy, about balancing professional and vocational training with shrinking opportunity, about balancing production with consumption, about balancing labor with management, about social balance—about every kind of balance except budgetary—we rested on balance while the totalitarians rushed ahead. It was not a question of population; we have more than either Japan or Germany. It was not a problem of resources; we have vastly more than any of our Axis enemies. There was no shortage of capital; we had it lying idle. There was no lack of skill or training or capacity or ingenuity. There was want of faith and conviction; "safety first," which began as a mere traffic slogan, was woven into the fabric of our economic system.

Shortage of Risk-Takers

Energy was wasted in warfare between Government and business. Mutual suspicion absorbed attention from constructive purposes. As confidence waned, enterprise flagged. Second and third generation men fled the responsibilities of ownership, until a disproportionate amount of industry is owned by women and often managed almost as much in the spirit of trusteeship as of enterprise. Recently the president of the New England Council said: "Everywhere we find conviction that risk-taking is essential to free enterprise, and everywhere we encounter a reluctance to take risks . . . We all know advocates of free enterprise who are contradicting their aspirations with their actions by putting their own once dynamic dollars to sleep in the manacled hands of a trust fund."

*From an address before the Second War Congress of American Industry, December, 1943.

The decade before the war furnished adequate evidence that a devoted communist or a convinced Nazi will display more enterprise than a defeated and discouraged democrat. The prewar demonstration that there is no exclusive relationship between freedom and enterprise has been doubly proved since the war began. We now have a surge of enterprise in the midst of marked restrictions on freedom. Much of the risk capital is supplied by the taxpayer; the Government is the entrepreneur; the Government allocates materials; the Government buys the bulk of the product; the Government determines the labor policy and controls wages; the Government fixes prices and limits profits. Yet production is at an all time high; national income is at a new peak.

Indeed, many have concluded that the way to greater enterprise is by less freedom and more Government planning—a managed economy. How else account for the constant reiteration that wartime controls will have to be maintained after peace, perhaps indefinitely? How explain otherwise why we hear so little of freedom for enterprise and so much of freedom from want and freedom from fear?

I believe that those who see in the present situation a vindication of the planned economy are wrong. It is not in any real sense an economy at all. It can be called an economy with no more propriety than a battle can be called an essay in persuasion. It is a war activity, which, if continued indefinitely, would lead to perpetual war. A sounder interpretation of the current surge of enterprise is that despite bureaucratic confusion and administrative mismanagement, business leaders believe so profoundly in the American tradition of freedom that they are determined to restore it and preserve it. To convince the American people on that point, however, it will not suffice to exemplify the virtues of enterprise alone. You must show forth the faith and the fruits of freedom.

Freedom! To think about the word honestly, we must leave security and safety-first behind. It is no word for a tired or hesitant people. It is for men of courage and faith; risk is ever an essential quality.

Freedom and the National Recovery Act

We might just as well be perfectly candid. For over a decade our Government has not been very perceptive about the substance and the implications of freedom. In many ways it has impaired free enterprise; illustrations abound. But political leaders are not alone to

blame, for at a critical moment business united with Government in the NRA, which in its conception, its execution, and its aftermath proved detrimental to freedom—and even to enterprise.

The test of faith in freedom does not come when the business cycle is on the rise, profits are satisfactory, and employment is regular. The acid test comes when things are going badly, and a little help would be most welcome. The NRA was the product of crisis; that is its significance for this discussion.

The proposal came from men influential in business circles. Yet it has been said on adequate evidence that it reflected "feeble, if not paralyzed, initiative," and wavering faith in "the more fundamental institutions of our economic system. In such a scene it seemed to groups with varied, even conflicting views, to offer an instrument for forwarding their aspirations and for generating economic advance."

Whether or not it really represented business opinion, it constituted a strange alliance between supposedly "conservative" industry and a statesman who sought to embody the "liberal" point of view. The "liberal" statesman abandoned a fifty-year opposition to monopoly, and businessmen invited Government interference in things which theretofore had been left to free enterprise. Nothing could more fully epitomize the essential incoherence of the alliance.

The NRA was not the product of theorists, determined to commit us by devious means to a managed economy. It was dominated by practical men who knew so little theory that they did not recognize obvious similarities to fascism.

Fascism was the union of an enemy of capitalism, a renegade socialist who believed in state control, with the representatives of large business enterprises, who were willing to surrender initiative and freedom in exchange for security and the discipline of the laboring classes. In Germany Hitler, who hated capitalism, was supported by Fritz Thyssen and other industrialists. Whatever the business acumen of Thyssen, it is overshadowed by his political stupidity, by his failure to see that in the search for order, freedom would be lost.

A profound truth was expressed by Count Sforza when he declared: "The significant symptoms of the mental diseases which . . . seized upon European thought is this, that there should have been . . . 'conservatives' who rejoiced in the destruction of laws, . . . who failed to realize that in vindicating regimes destructive of freedom they thereby

disavowed their own fundamental principles." That mental disease by no means left America unscathed. It will remain one of the paradoxes of history that it took a so-called "horse and buggy" Supreme Court to prevent a professedly liberal administration from committing us to principles and practices of fascism.

Legacies of the NRA

The NRA failed to cure unemployment. If that were the whole story, it could be written off and forgotten. Unhappily, that failure did not close the account. The continuing vital importance of the NRA is that it left us legacies which have bedeviled both Government and business ever since. The Government acquired new powers and new habits which still linger, long after the instrumentality has disappeared.

The first legacy was a strengthened tendency to substitute a government of men for a government of laws. Instead of accomplishing its purpose through general statutes, applicable to all industry alike, the NRA gave broad discretion to an administrative agency which combined legislative, executive, and quasi-judicial powers. Indeed, its function was like that of the Italian Fascist Ministry of Corporations—a "central administrative organ of coordination." Both were based upon bureaucratic management. Businessmen unwittingly helped Marxian theorists plant and implement the concept of a managed economy in America.

The application of the business technique of fluid judgment to the processes of government proved disastrous both to efficiency in government and to freedom in business. It destroyed an essential of free enterprise—knowledge of the rules of the game, and confidence that they will not be changed quixotically. That confidence must be restored. At the same time the NRA encouraged Government to modify the sound techniques developed by long experience, and employ methods which disregarded the democratic process and functioned only at the sacrifice of freedom. Ever since there has been a marked tendency for Government agencies to expand their power by strained interpretations, which circumvent restrictions, and by the assumption of authority not granted by Congress. That must stop.

The second legacy was control over labor relations. Under the corporative state in Italy the confederation of fascist labor syndicates and the confederations of fascist employers were legally recognized and their collective contracts made binding. Under the

NRA long strides were taken in the same direction. There is no need to elaborate the consequences of the habit of exercising governmental power over wages and hours in industrial relations. It is a dominant factor in the current situation—for example, in the coal fields.

A third legacy was control of production. Once the assumption is made that government should "balance production with consumption," it follows that government must also make a distribution among the units of production. Such a function cannot be discharged by the enforcement of general rules; it requires bureaucratic management as a substitute for the law of supply and demand. Power over capacity to produce can go to extreme lengths. I remember a friend assuring me that "after six months it will require a certificate of convenience and necessity for a new competitive enterprise" to be established in his industry. He was not preaching or exemplifying the virtues of either freedom or enterprise; he was unconsciously attempting to exchange freedom for security. Events proved that he lost one without achieving the other. Government control of production left important residues in the habits of thought and action of the bureaucracy.

Price Control and Bureaucracy

A fourth legacy was government price control. Price regulation, almost by definition, cannot be handled by general law; it requires administrative management. Disregarding the free decisions of millions of individual citizens as expressed in the market place, the bureaucracy determines prices. That process is the very reverse of economic democracy. Bitter experience has made it clear that prices can be controlled in a manner hostile to free enterprise even more readily than in its support. Calling the Government into this activity opened Pandora's box.

A fifth legacy remains to plague free enterprise. The NRA strengthened a popular suspicion that business is really under the control of monopolists or quasi-monopolists. The perspective of history shows that the processes of the NRA were markedly monopolistic. Individual enterprise and little business did not fare well in that collective effort, though they are vastly important. They never prosper under collectivism of any sort; freedom requires competition. Monopoly is a form of collectivism to which the American people have long been bitterly hostile. The NRA was a deviation from that sound tradition. I believe that business leaders are now

(Continued on page 20)

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American Agriculture to Get More Potash

Good news for American farmers in their fight to meet war food goals is contained in the announcement being made by the War Production Board that approximately 200,000 tons additional potash salts are now being allocated for fertilizer use in the United States, Puerto Rico, and Hawaii. This Period 3 allocation is equivalent to about 100,000 tons K_2O and added to that previously allocated provides a total of 580,000 tons K_2O for American agriculture during the current crop year. This total exceeds by 25,000 tons K_2O the average of that delivered for agriculture during the preceding two crop years, the basis of allocations.

These additional supplies are the result of the cancellation of a part of Lend-Lease exports and added production through increased efficiencies on the part of the American Potash Industry.

The greatly expanded chemical industries have been allocated nearly 100,000 tons K_2O , a fourfold increase over pre-war usage.

Canada is also sharing in the increased supply, being allocated a total of 39,000 tons K_2O for the year. Other exports, including Lend-Lease, have been given a total allocation of about 26,000 tons K_2O . The potash thus allocated during the 1943-1944 year exceeds 745,000 tons K_2O .

The details on the allocation are as follows:

TOTAL POTASH ALLOCATIONS 1943-44 (Short Tons K_2O)		
Agriculture in U S, Puerto Rico and Hawaii..	580,027	
Chemical Industries.....	99,723	
Canada.....	39,000	
Export.....	26,432	
Total.....	745,182	
BREAKDOWN OF AGRICULTURAL ALLOCATION		
	Salts Tons	Equivalent K_2O Tons
60% Muriate.....	702,308	421,384
50% Muriate.....	97,334	48,667
Sulphates.....	141,112	51,915
Manure Salts.....	232,244	58,061
Total.....	1,172,998	580,027

Fulton Elected A. I. M. E. President

Chester A. Fulton, president of Southern Phosphate Corporation, has been elected president of the American Institute of Mining and Metallurgical Engineers, one of the nation's leading scientific societies.

January Sulphate of Ammonia

The figures of the U. S. Bureau of Mines show that the production of by-product sulphate of ammonia and ammonia liquor are continuing at about the established levels. Sulphate of ammonia showed an increase of 2.6 per cent over December, while ammonia liquor decreased 5.5 per cent. Shipments are continuing at a level somewhat higher than production, with the result that stocks on hand at the end of the month show a decrease of over 3,000 tons. The supply on hand on January 31st represented about 12 days' production.

	Sulphate of Ammonia Tons	Ammonia Liquor Tons NH ₃
Production		
January, 1944.....	67,875	2,746
December, 1943.....	66,154	2,903
January, 1943.....	64,116	2,902
Sales		
January, 1944.....	71,010	2,922
December, 1943.....	70,352	2,969
January, 1943.....	69,414	2,831
Stocks on Hand		
January, 1944.....	26,079	906
December, 1943.....	29,431	991
January, 1943.....	40,592	1,201

More Gasoline for Fertilizer Representatives

Special gasoline rations may now be issued by local War Price and Rationing Boards to representatives of fertilizer manufacturers or mixers for automobile travel to the places of business of fertilizer dealers and agents, the Office of Price Administration announced recently.

However, these rations can be issued only if the applicant presents to his board a certification from the Chief of the Fertilizer Division, Office of Materials and Facilities, War Food Administration, that travel by the applicant is necessary to the success of the WFA fertilizer transportation program. The object of this program is to increase the use of railroads for fertilizer transportation, since available trucking facilities have been sharply cut.

OPA has been informed by WFA that the cooperation of dealers and agents in this program can be obtained only through personal contact by representatives of manufacturers and mixers, who are in a position to explain the changes in fertilizer transportation methods necessitated by wartime conditions.

In cooperation with this WFA program, OPA will make available the mileage rations required by representatives of the fertilizer companies. These special mileage rations will

not be valid after May 30th, the end of the season's program. Mileage will not be allowed for travel that could reasonably be performed through use of alternative means of transportation. In addition to certifying that the applicant's travel is essential to the fertilizer transportation program, WFA officials will also certify the number of miles an applicant will be required to travel.

N. F. A. Appointments

L. W. Rowell, who retired on January 1st as vice-president of Swift & Co., has been elected an honorary life member of the National Fertilizer Association. His place on the Board of Directors of the Association, also on the Executive Committee, has been filled by the selection of C. T. Prindeville, vice-president of Swift & Co.

Edward J. Buhner, secretary-treasurer, The Buhner Fertilizer Co., has been selected by the Board of Directors to succeed the late W. B. Norris as a director from District 10, to serve until the next annual meeting.

A. H. Carpenter, Armour Fertilizer Works, has been appointed a member-at-large of the Soil Improvement Committee to succeed the late W. J. Gray.

C. B. Robertson, Robertson Chemical Corp., has been appointed a member of the Public Relations Committee to succeed B. B. LeCompte.

Sulphur Shipments by Inland Water Route

The War Production Board announced on February 9th that it has arranged for shipment of sulphur required by eastern States from Louisiana and Texas via the Mississippi-Great Lakes-Erie Canal route to New York harbor. About 248,000 tons are involved.

The program was approved at a meeting of chemicals industry representatives and WPB, Federal Barge Line, and Office of Defense Transportation officials held recently in New York.

Barge line officials reported that the line will be able to haul a minimum of 250,000 gross tons from Louisiana and Texas to Chicago for lake movement during 1944. Ten newly-allocated steel barges will enable the line to exceed 1943 deliveries to Chicago by approximately 50,000 gross tons. The 1943 deliveries of sulphur for lake movement by the Federal Barge Line were 208,000 gross tons, as compared with 318,000 in 1942. Representatives of the New York State Barge Canal reported the canal will have ample

capacity to handle the increased sulphur tonnage, either via Buffalo, or Oswego, or both.

The movement will begin with the opening of internal waterway navigation in the spring. According to WPB officials, efforts will be made to complete local Buffalo sulphur deliveries prior to the opening of the barge canal.

January Tax Tag Sales

Total fertilizer sales in January in 17 States, as indicated by the sale of tax tags, amounted to 1,243,750 tons. This represented moderate increases over January, 1942, and January, 1943.

This is the third successive year in which the prewar seasonal pattern of fertilizer buying has been sharply changed by earlier buying. Prior to 1942, January sales averaged

less than a half million tons, with a peak of 545,000 tons in January, 1941. In contrast to that, sales in each of the last three Januarys were above a million tons. Transportation difficulties and possible shortages, combined with the large demand for fertilizer, have moved up the period of heavy buying.

Aggregate sales in the first seven months of the current fiscal year, from July through January, were 44 per cent larger than in the corresponding period last year and 56 per cent larger than two years ago. Sales were larger this year than last in all of the 17 reporting States. It is not possible to determine how much of this increase is due to earlier buying this year and how much, if any, is due to an actual increase in sales. It seems likely, however, that when the results for the complete season are available they will show a moderate rise over last spring.

FERTILIZER TAX TAG SALES

STATE	JANUARY				JULY-JANUARY		1941-42 Tons
	1944 Tons	1943 Tons	1942 Tons	% 1943	1943-44 Tons	1942-43 Tons	
Virginia.....	66,574	60,272	93,048	142	235,539	165,773	194,112
North Carolina.....	256,063	219,452	360,958	137	590,191	431,781	523,850
South Carolina.....	154,358	154,321	121,173	134	349,783	261,751	189,311
Georgia.....	198,018	159,843	79,249	146	422,199	288,727	143,479
Florida.....	113,022	102,274	92,157	129	497,179	384,183	412,562
Alabama.....	153,600	121,050	105,350	219	316,900	144,500	126,000
Mississippi.....	84,000	94,164	73,950	130	247,645	191,145	127,825
Tennessee.....	21,288	13,738	15,539	152	69,159	45,514	36,081
Arkansas.....	19,358	32,700	37,900	135	61,248	45,308	51,000
Louisiana.....	31,600	29,400	25,750	152	103,830	68,305	60,400
Texas.....	17,900	19,225	24,625	169	76,500	45,196	50,230
Oklahoma.....	4,150	4,100	650	191	10,585	5,541	4,725
Total South.....	1,119,931	1,010,539	1,030,349	143	2,980,758	2,077,724	1,919,575
Indiana.....	24,689	49,850	97,564	116	287,944	248,439	201,829
Illinois.....	28,100	18,751	15,365	187	72,651	38,892	31,818
Kentucky.....	29,388	8,230	16,623	206	78,175	37,931	40,640
Missouri.....	36,962	3,059	7,579	233	88,858	38,146	58,240
Kansas.....	4,680	50	15	342	17,714	5,173	13,633
Total Midwest.....	123,819	79,940	137,146	148	545,342	368,581	346,160
Grand Total.....	1,243,750	1,090,479	1,167,495	144	3,526,100	2,446,305	2,265,735

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FERTILIZER MATERIALS MARKET

NEW YORK

Potash Allocations Made for April and May. Some Manure Salts to be Re-allocated. Other Materials Moving Steadily. Labor Shortage Hindering Shipments. Labor Trouble in Phosphate Rock Fields.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, February 24, 1944.

Potash

New allocations have now been made for shipment during the third period, that is, April and May of this year, and we understand all buyers promptly placed their orders for all of the high grade material allocated to them. In some instances certain buyers advised they could not accept delivery of all the manure salts allocated to them and it is probable that, due to this, some tonnage of crude material will be reallocated. Most buyers need potash badly and are pressing shippers although we do not believe that the shippers are behind on their deliveries.

Sulphate of Ammonia

Material is moving steadily against previous allocations and undoubtedly the fertilizer industry would accept considerable additional material, if new allocations were made.

Ammonium Nitrate

Movement is steady and it is believed large quantities will be used during March, but it is likely that buying of this material will dwindle during April and May.

Superphosphate

Production continues satisfactory although the demand is such that no stocks are accumulating.

Triple Superphosphate

Production of this material has increased somewhat but the labor situation is holding up shipment of this material, and in many instances where sufficient stocks are on hand to supply demand, material cannot be moved as quickly as both sellers and buyers would like.

Phosphate Rock

Movement of this material continues in large volume but the labor situation is bad; in fact, in some plants production was held up for a few days due to the demands of labor.

BALTIMORE

Spring Fertilizer Volume Depends on Labor Supply. Materials Being Delivered on Allocations. Organics Very Scarce.

Exclusive Correspondence to "The American Fertilizer"

BALTIMORE, February 23, 1944.

With favorable weather conditions the spring season has gotten off to a good start, and if fertilizer manufacturers are able to secure ample labor, indications point to a good fertilizer season from the standpoint of volume.

Ammoniates.—There is nothing new in the situation. The output of tankage and blood is practically all going into the production of feeding material on account of higher ceiling price for that purpose as compared with the ceiling price for wet rendered tankage for fertilizer purposes. This has compelled fertilizer manufacturers to purchase vegetable meals and other sources of organic ammoniates for their formulas.

Castor Pomace.—The situation continues tight with no further offerings on the market at present.

Sulphate of Ammonia.—Deliveries are being made against allocations, and there are no re-sale offerings on the market.

Nitrate of Soda.—This material is still being allocated, and is being used in the place of sulphate of ammonia in mixtures where manufacturers are unable to secure desired quantity of sulphate.

Superphosphate.—Due to the scarcity of sulphuric acid, no stocks of superphosphate are accumulating, and the market is firm at ceiling price of 64 cents per unit of A. P. A. with no offerings on the market even at this figure.

Potash.—The market is firm and deliveries are being made against contracts previously booked. Likewise there are no re-sale offerings of this material on the market.

Bone Meal.—There is a dearth of offerings of both raw and steamed bone meal, and the

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market is so high as to make bone meal unattractive for plant food.

Bags.—There has been a slight easing up in the burlap situation, but not much activity in fertilizer bags, as manufacturers have practically covered for paper bags for the coming spring season's requirements.

CHARLESTON

Feed Market Taking Almost All Organics. New Allocations of Potash Show Increased Output Available.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, February 21, 1944.

Organics.—These continue exceedingly scarce and although some blood is being brought in from South America, it is all going into feed.

Castor Meal.—The small production, coupled with the amount bought by the Government, continued to keep this material in a very short position.

Potash.—WPB has just allocated additional potash, which in terms of K_2O means that the total allocated will be about 25,000 tons more K_2O than fertilizer manufacturers received during the preceding two crop years.

Cottonseed Meal.—This continues scarce with no change in the market. The 8 per cent grade is priced as follows: Atlanta, \$49.50; Memphis, \$48.50.

PHILADELPHIA

Little Activity in Materials Market. Due to Allocations and Scarcity of Organics. Some Demand for Cotton Hull Ashes.

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, February 21, 1944.

Activity seems to have quieted somewhat during the past couple of weeks, owing perhaps to the fact that buyers have given up hope of obtaining some of the scarce materials, and have all of the allocated materials which they are entitled to purchase.

Interest in developments affecting the fertilizer industry centered around the restrictions put on producers of nitrogenous tankage as to their use of certain raw materials (leather); WFA purchases of fish meal, etc.; and the labor problem, which does not get any better.

Ammoniates.—The chemical materials, being chiefly under allocation, fall into a more or less routine pattern as far as business activity is concerned, although some mixers could use additional of the allocated chemicals, if they were so permitted. As for the organic materials, few mixers appear to have been able to secure quantities up to the permissible limit, owing to the general scarcity. While a little more dried blood appeared in this section, yet prices held at the ceiling, which is ordinarily considered too high for fertilizer purposes.

Sulphate of Ammonia.—The fertilizer people could probably use larger quantities of this commodity, if larger allocations were made. Rate of production seems to maintain an even pace.

Nitrate of Soda.—While this material is also under allocation, yet most users seem to get sufficient, particularly for direct application to the soil.

Superphosphate.—This material seems to continue to hold a good rate of manufacture, and mixers are using more than in other years.

Bone Meal.—Still scarce, even though imports are noted.

Potash.—Some mixers apparently have not been able to secure even their allocated tonnage, although it is believed that generally the supply is sufficient to take care of all to the extent of the allocation. In tobacco-growing areas, mixers appear to be considering the use of unallocated cotton hull ashes, of which the supply, while not large, is fairly good.

Castor Pomace.—No easing noted in the supply position of this commodity.

Manufacturers' Sales Agents for **DOMESTIC**

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CHICAGO

Few Offerings of Fertilizer Organics and Consequently a Quiet Market. Feed Tankage Production Increases.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, February 21, 1944.

Prevailing conditions in the organic markets continues about in line with recent preceding weeks. While sellers decline making offerings extreme quietness dominates the situation. The proposed elimination of chrome leather in nitrogenous may have a serious effect on the production.

In the feed market, production of tankage has been quite heavy, but demand still exceeds the available supplies.

Ceilings are well maintained:

High grade ground fertilizer tankage, \$3.85 to \$4.00 (\$4.68 to \$4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, \$5.53 per unit ammonia (\$6.72 per unit N); blood, \$5.38 (\$6.54 per unit N); dry rendered tankage, \$1.21 per unit of protein, Chicago basis.

TENNESSEE PHOSPHATE

Manpower Shortage Felt in All Branches of Phosphate Rock Production. More Gasoline Needed for Distribution Men.

Exclusive Correspondence to "The American Fertilizer"

COLUMBIA, TENN., February 21, 1944.

Shipments to all consuming channels, including heavy local consumption by the two electric furnace plants at Columbia and Mt. Pleasant as well as the Government plant at Muscle Shoals, keep the stock piles at all the local mines at the lowest ebb, which has been the customary condition now for several years.

Manpower is still the bottleneck, both as regards shipment of fertilizer from the local plant at Mt. Pleasant, and the three plants shipping ground rock for direct application. All three of them have orders for far more than

they can possibly ship and all the sales forces of all the companies engaged in distributing phosphate rock to the farmers are busy not in selling any more, but attempting to make the best possible distribution of the phosphate rock that can be ground by the mills installed, and loaded by the manpower at hand. Many short-sighted local rationing boards, however, still class these men as only salesmen and, with inability to get the necessary gas, they are greatly handicapped in their efforts and much has to be left to the best judgment of the shippers as to where the greatest good for the greatest number of pounds of food production can be accomplished. The men who have taken the orders which now so far overtax capacity, are really the only ones who can effect the best distribution by being able to actually travel their territories, review the actual situation and select the orders which really should be shipped preferentially. Ration boards which really investigate, recognize the facts, but so few investigate.

It is understood that the AAA has not placed any orders for phosphate rock for direct application in their grants of aid program in Illinois and Kentucky, the only two States in which it applies, except from Florida mines, and most of the installed mill capacity there is occupied with grinding for acidulators, or for direct application in the Southeastern area, where freight rates are lower. Producers were deterred from installing greater capacity before the emergency by the fear of Government competition and now, of course, it is considered foolish to attempt to increase grinding capacity with the difficulty in getting equipment and manpower to operate it.

The committee appointed by the Governor of Tennessee to investigate and recommend legislation to effect the refilling of mined-over phosphate lands, had its initial meeting last Friday, organized and, it is reported, will soon start surveys to get the facts. Strip mining of



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coal, limestone quarries and clay, sand and gravel pits are not considered as offensive to the esthetic eye, and only the phosphate mines are affected. If anything is done in the matter, it will doubtless force onto the market some of the thousands of acres that have been held for many years by original owners in the hope to get a fair price for their lands, and enable the operators to pick up these lands at the low prices offered, as they constitute the largest acreage of mined lands not actively operating.

FREE ENTERPRISE

(Continued from page 11)

convinced it was a mistake, but your actions must reassure the American people.

The historical fact, therefore, is that in the last great crisis freedom was not implemented; enterprise was not stimulated. Instead competition was restricted, prices were protected, new developments obstructed. Industry helped shackle itself. Stabilization and secure status were the goals instead of hazardous freedom and vigorous enterprise.

Government and Business Functions Defined

Experience with the NRA supplies clearest evidence that business should not undertake the functions of government. There is equally good evidence that democratic government cannot take over the function of business. Business and government are different kinds of activities; neither should do the work of the other. Government should be primarily concerned with law and its enforcement, business with production and exchange in an open market. Government should operate principally by fixed rules made by representatives of the people, chosen in free elections. Business should function by fluid decisions that find their ultimate test in a free market, where the public reveals what it wants and what it is willing to pay.

Now we are moving toward a new crisis—the tremendous readjustment from war to peace. It was easier to make the transition from peace to war. That required energy and resourcefulness, but it could neglect economies and permit extravagance, for the taxpayer ultimately foots the bill.

The return to peace will furnish a fresh test of faith in freedom. Will it be sold short as in 1933, or have we learned our lesson so that we dare accept the hazards that freedom involves? Thus far, in domestic policy, our political leaders have exhibited concern for security, dread of unemployment, apprehension over social tensions, doubts about labor relations. They seem immersed in problems rather than fired with enthusiasm for freedom. Fear still appears more frequently than faith in their basic vocabulary. Until public opinion forces a reversal of that psychology, we will hear more and more of the managed economy, and enterprise will not again be free.

Businessmen must work toward that reversal of emphasis, for free enterprise can never be recovered as a thing apart. No demand for freedom for business, as such, will succeed. It must come as an integral part of the larger idea of human freedom. The foundation of freedom is not economic at all. Its roots are in spiritual life, in the innate

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dignity of man. It is developed intellectually, as an idea. Then—and only then—it is supported by economic and political activity. Democracy is its appropriate political instrument, and free enterprise its appropriate economic support.

Only those genuinely concerned with individual liberties really support free enterprise. This is so profoundly true that it is fair to say that the phrase "free enterprise" omits the key word. It must be understood to mean "free *individual* enterprise," for freedom is the characteristic not of society, or a union, or a corporation, but solely of man. If we believe in free enterprise, we must make individual enterprise possible not alone within the framework of the state, but also within the structure of the union, and within the fabric of the corporation.

"Free Individual Enterprise"

A corporation can have only such rights as are granted by the state, for it is the creature of the law. It is not an ultimate, but merely an instrument, without innate capacity for freedom. It has no personality, no spiritual quality—those are the inherent and exclusive possessions of individuals. Properly conceived, the corporation is a public servant. It serves by supplying desirable goods and services at prices determined by real competition. In that service, it remains subsidiary to the state, but in our democratic system the state itself, however powerful, is also the people's servant. It is perfectly obvious, therefore, that in a free government the individual alone is entitled to fundamental rights—that is, rights against the state.

The system of free enterprise began with individuals. In all the history of the world there had never been such a release of individual energy as freedom supplied. By courage and imagination, by skill and wisdom, men succeeded. Sometimes an individual became so strong that he exerted his influence by power rather than by wisdom. But by the overwhelming fact of mortality, even the most powerful returned eventually to the common dust. Through the corporate structure, however, the accretion of power could gain a kind of immortality and prevent the dissolution of power by death and its resettlement among

new figures upon the stage. In such circumstances power would remain more important than wisdom. That must be prevented if free enterprise is to flourish.

Business judgment is identical with the public interest only when it is the judgment of many freely expressed in a free market. When a man makes his own individual decisions, he has to operate both as buyer and seller, both as producer and consumer; he is on both sides and wins or loses in accordance as his judgment is wise or foolish. If through undue consolidation business judgment becomes collective rather than distributive, it is hostile to freedom. That is the source of the bitter opposition of the American people to monopoly, which is merely a manifestation of power, where gain or loss depends not upon wisdom or folly but upon leverage. We can observe that in political life. For a considerable period Hitler and Mussolini appeared to succeed; the reason was that their decisions were not put to the acid test of right or wrong, but only to the false test of power against weakness.

Democracy Versus Collectivism

In the interest of free enterprise, business should avoid collectivism. It should not attempt to manage our economy or to govern; it should stick to its true function, which is to produce and market what the people want. If business indulges in collective judgments, then every other interest group will develop collective judgments. Furthermore, if judgments are based upon the power of a few and not upon the wisdom of the many, the most powerful interest group will ultimately prevail and others will be liquidated. Then collectivism, either in the fascist or communist form, will have triumphed over free enterprise.

It becomes clear that any collectivist organization may limit the freedom and hamper the enterprise of the individual. It can be done by the state, and with that we are familiar. It can be done by the labor union which in representing the collective rights of workers may suppress their individuality and injure their personal dignity. It can also be done by the corporation, which may purchase labor without concern for developing initiative and the spirit of enterprise in the workers. In

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Cleveland, Ohio	Houlton, Me.	Pensacola, Fla.	



MENTION "THE AMERICAN FERTILIZER" WHEN WRITING TO ADVERTISERS.

fact the employer may resent the difficulties created by individuality and prize docility and discipline more deeply. That was the tragic—indeed the fatal—mistake of European business. It rests therefore upon the corporation, in the interest of the preservation of the system of free enterprise by which alone it functions, to show a deep concern for, and actively to implement individual initiative, personal freedom, and enterprise.

From Napoleon to the last World War a century elapsed without the profound shock of global strife. Indeed the World War was the first great conflict since the industrial revolution. The shattering nature of its impact and the dislocations of its aftermath were too little understood. The ensuing mistakes led first to a world wide depression and then to a new world war; those were the climax of a long series of economic and political failures.

Depression and war have proved rough schoolmasters. The heedless Twenties and the defeatist Thirties produced the war-torn Forties. I hope we have learned our lessons. I am confident we will emerge from this struggle against autarchy and tyranny with a refreshed philosophy and a renewed faith in freedom, a revived respect for the individual citizen, and a revitalized confidence in the democracy that expresses his will. Then we can advance with courage to the solution of our problems in the spirit of freedom, and with the immeasurable energy of free enterprise.

WHERE DO WE STAND WITH FERTILIZER?

(Continued from page 8)

factory stands of ladino were maintained in all the plots except that which was untreated.

The amount of phosphoric acid (80 pounds per acre annually), according to the author, is more than the crop removes from the soil, but a similar application of potash is 75 pounds less than that taken out annually. Since the planting was made on a soil with considerable potash reserve, future recommendations for this element may have to be increased.

From the work reported, which is but a fraction of that which has been done with hay crops, it is easy to see that with a potash shortage or even a scarcity which would

eliminate its use on hay crops classed in group B, serious effects would be noted immediately so far as legume production is concerned.

A good deal of effort was expended in the 1930's upon the improvement of permanent pastures. Work started by the National Fertilizer Association was pursued in many States to determine the effect of fertilizers on old pasture sods. The story told by these trials reflects much of the data which has been discussed above with hay crops. The type of response secured was colored by the existing vegetation or by the vegetation that was induced to enter the stand because of the kind of fertilizer applied.

Average results tell the story for an average pasture but not for specific ones. For example, very heavy soils which will support dense stands of wild white clover will respond more to applications of potash and phosphoric acid, while on the lighter soils on which grasses predominate, a greater relative response will be secured from nitrogen.

It seems worth while, because so much effort has been expended in this direction, to summarize this work here. For this purpose and since the treatments were identical (and the results quite similar), data for Maine (9), New Hampshire (10), and those published by the National Fertilizer Association (11) have been averaged.

TABLE V

Treatment	Yield, Pounds Dry Matter per Acre	Yield, Pounds Protein per Acre*
None.....	1065	145
P.....	1322	199
LP.....	1444	236
LPK.....	1752	299
LNPK.....	2500	450

*Averages for Maine not included in protein results.

These data cover a large number of pastures and indicate the relative response for adding an element or substance to the previous treatment. Perhaps the data are more valuable for pointing out the reason why so many permanent pastures are relatively worthless than for gaining a judgment as to fertilizer response. If they do mean anything in respect to this, it is that no one substance but,

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Pioneer Producers of Muriate of Potash in America

See Page 4



a combination of all, is necessary for maximum improvement.

Thousands of acres of permanent pasture have been improved by top-dressing largely as a result of the stimulus of work of this sort. One research worker in New England has pointed out that the cheapest feed for dairy cattle is obtained from untreated permanent pastures. This is true, without a doubt. But it is also true that the cheapest purchased feed is usually that which is bought with "fertilizer applied to a good pasture sod."

And we do not mean to leave the impression that top-dressing permanent pastures is the answer to the whole pasture problem. High-producing herds need more intensive feeding than a permanent pasture will produce and over a longer period, particularly through the middle of the summer. For this purpose ladino and other clovers, along with timothy and other high-yielding large grasses, enter the picture.

It would be ideal, in summarizing an article of this kind, if we could say in evaluating the elements that all have an equal value or that one is responsible for 48 per cent, another for 32 per cent, and another for the remainder of crop increases. The need for fertilizer balance is so great and the effects of fertilizers and lime are so interrelated that actual percentages had best be left to the imagination.

Not all the crops which we have here in New England have been discussed. Vegetables and fruit, corn and many other crops would enter the picture in a complete treatise on this subject. Nitrogen appears to be the paramount need for fruit yields, phosphorus for large corn yields, and yet a certain balance is required here as it is for vegetables and other crops.

From what we have so far reported, the prospect of a possible potash shortage in relation to demand is not a happy prospect. It would be serious for the potato crop if this

substance were not available in adequate supply. Dairy crops too, which, as we have previously pointed out, fall into the B group, will suffer from a potash shortage, especially ladino and other clovers which are so vital at this time for high milk yields. Growing legumes is our best method of offsetting the grain shortage. Hence any hindrance in producing them is a positive handicap, particularly in view of their great need.

Literature Cited

- (1) Bull. 324 June 1940, N. H. Exp. Sta. Prince, Blood, Coates, and Phillips
- (2) Bull. 414 Jan. 1943 Maine Agr. Exp. Sta. Chuccka, Hawkins, and Brown
- (3) Bull. 203 May 1935—Conn. (Storrs) Exp. Sta. B. A. Brown.
- (4) Bull. 306 May 1938 N. H. Exp. Sta. Prince, Phillips, Blood, and Percival.
- (5) Bull. 271 Apr. 1933, N. H. Exp. Sta. Prince, Blood, Phillips, and Percival
- (6) Cir. 58 Apr. 1942, N. H. Exp. Sta. Prince, Blood, Percival, and Scripture
- (7) Cir. 50 June 1936, N. H. Exp. Sta. Prince, Phillips, Blood, and Percival
- (8) Cir. 61 Apr. 1942, N. H. Exp. Sta. Prince, Blood, and Percival
- (9) Bull. 415 Feb. 1943, Maine Agr. Exp. Sta. D. S. Fink.
- (10) Bull. 320 Apr. 1940, N. H. Exp. Sta. Prince, Percival, Blood, and Scripture.
- (11) Progress Report, Feb. 1931, N. F. A., J. B. Abbot, et al.



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ACID BRICK

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS

Chemical Construction Corp., New York City.

ACIDULATING UNITS

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DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR

Barrett Division, The, Allied Chemical & Dye Corp., New York City.
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Chemical Construction Corp., New York City.

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AMMONIUM NITRATE SOLUTIONS

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St. Regis Paper Co., New York City.
Textile Bag Mfrs. Association, Chicago, Ill.
Union Bag & Paper Corporation, New York City.

BAGS—Cotton

Bemis Bro. Bag Co., St. Louis, Mo.
Textile Bag Mfrs. Association, Chicago, Ill.

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Bagpak, Inc., New York City
Bemis Bro. Bag Co., St. Louis, Mo.
St. Regis Paper Co., New York City.
Union Bag & Paper Corporation, New York City.

BAGS (Waterproof)—Manufacturers

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Textile Bag Mfrs. Association, Chicago, Ill.
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Sackett & Sons Co., The A. J., Baltimore, Md.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

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Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

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Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
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Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator

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Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur

Chemical Construction Corp., New York City.

BURNERS—Oil

Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

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DuPont de Nemours & Co., E. I., Wilmington, Del.

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Link-Belt Company, Philadelphia, Chicago.
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Sackett & Sons Co., The A. J., Baltimore, Md.

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Duriron Co., Inc., The, Dayton, Ohio.

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CEMENT—Acid-Proof

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Chemical Construction Corp., New York City.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

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Link-Belt Company, Philadelphia, Chicago.
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Farmers Fertilizer Company, Columbus, Ohio.
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Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE

Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut

Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent

Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

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American Agricultural Chemical Co., New York City.

GUANO

Baker & Bro., H. J., New York City.

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Hayward Company, The, New York City.

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Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

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Bradley & Baker, New York City.
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Wellmann, William E., Baltimore, Md.

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MACHINERY—Acid Making

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Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling

Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying

Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Grinding and Pulverizing

Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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MACHINERY—Power Transmission

Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Pumping

Atlanta Utility Works, East Point, Ga.
Duriron Co., Inc., The, Dayton, Ohio.

MACHINERY—Tankage and Fish Scrap

Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MAGNETS

Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MANGANESE SULPHATE

McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corporation, Atlanta, Ga.

MIXERS

Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA

American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS

Chemical Construction Corp., New York City.

NITROGEN SOLUTIONS

Barrett Division, The, Allied Chemical & Dye Corp., New York City.

NITROGENOUS ORGANIC MATERIAL

American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., Wilmington, Del.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray

Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS

Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS

Chemical Construction Corp., New York City.

PHOSPHATE ROCK

American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Coronet Phosphate Co., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Virginia-Carolina Chemical Corp. (Mining Dept.), Richmond, Va.
Wellmann, William E., Baltimore, Md.

PIPE—Acid Resisting

Duriron Co., Inc., The, Dayton, Ohio.

PIPES—Chemical Stoneware

Chemical Construction Corp., New York City.

PIPES—Wooden

Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid

Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers

American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers

American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS

Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Wellmann, William E., Baltimore, Md.

QUARTZ

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

RINGS—Sulphuric Acid Tower

Chemical Construction Corp., New York City.

ROUGH AMMONIATES

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McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

SCRAPERS—Drag

Hayward Company, The, New York City.

SCREENS

Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SEPARATORS—Air

Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Including Vibrating

Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Magnetic

Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHAFTING

Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power

Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corporation, Chicago, Ill., and Cedar
Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers

Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS

Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA

American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New
York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

SULPHUR

Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Freeport Sulphur Co., New York City.
Texas Gulf Sulphur Co., New York City.

SULPHURIC ACID

American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.

SULPHURIC ACID—Continued

U. S. Phosphoric Products Division, Tennessee Corp.,
Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE

American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp.,
Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE—Concentrated

Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp.,
Tampa, Fla.

SYPHONS—For Acid

Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE

American Agricultural Chemical Co., New York City.

TANKAGE

American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Smith-Rowland, Norfolk, Va.
Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage

Huber & Company, New York City.

TANKS

Sackett & Sons, Co., The A. J., Baltimore, Md.

TILE—Acid-Proof

Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

TOWERS—Acid and Absorption

Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

UNLOADERS—Car and Boat

Hayward Company, The, New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

UREA

DuPont de Nemours & Co., E. I., Wilmington, Del.

UREA-AMMONIA LIQUOR

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VALVES—Acid-Resisting

Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

WHEELBARROW (See Carts)

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Tennessee Corporation, Atlanta, Ga.

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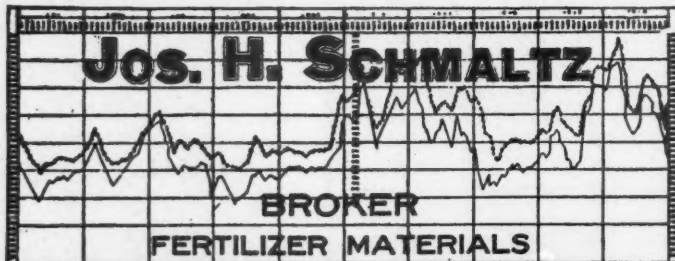
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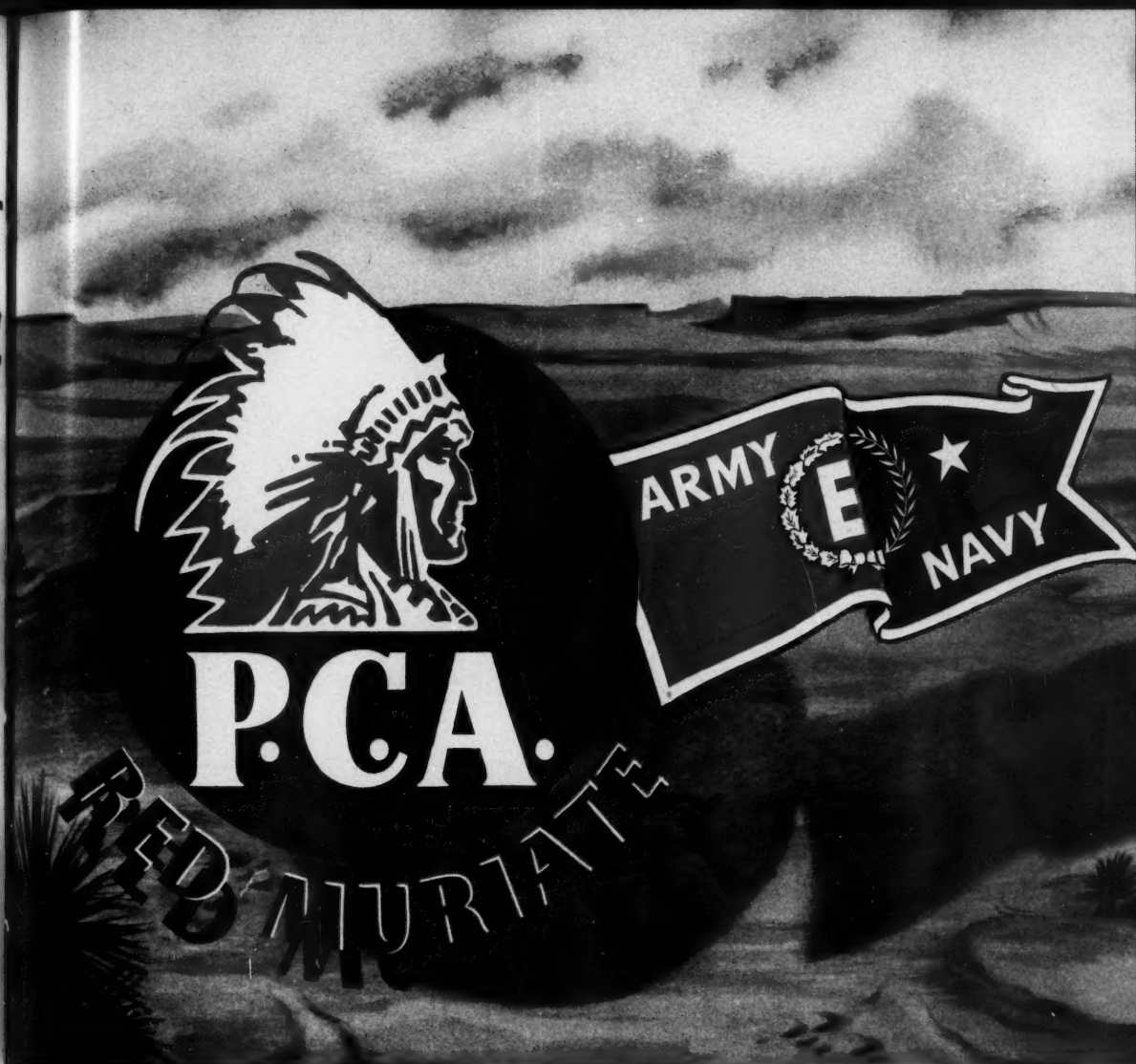
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